Cody Rivera

Curriculum Vitae
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Education

2022–present **Ph.D. in Computer Science**, *University of Illinois Urbana-Champaign*, Urbana, IL
Expected Completion Date: May 2027.

2018–2022 **B.S. in Computer Science and Mathematics**, *The University of Alabama*, Tuscaloosa, AL
Summa Cum Laude.
Minor: Randall Research Scholars Program.

Research Experience

2019–2022 **Undergraduate Research Assistant, High-Performance Computing and Data Analytics Lab**, *The University of Alabama/Washington State University*, Tuscaloosa, AL
Researched parallel GPU algorithms to process vast amounts of data in scientific computation workloads such as large scale simulations more efficiently. Supervised by Dr. Dingwen Tao.

Summer 2021 **Science Undergraduate Laboratory Internship (SULI) Program Intern**, *Argonne National Laboratory*, Virtual Internship
Improved the performance of lossy decompression for multidimensional scientific datasets by optimizing parallel Huffman decoding for GPUs. Supervised by Dr. Sheng Di.

Publications

Accepted Conference Publications

IPDPS 2022 **C. Rivera**, S. Di, J. Tian, X. Yu, D. Tao, and F. Cappello, "Optimizing Huffman Decoding for Error-Bounded Lossy Compression on GPUs," *The 36th IEEE International Parallel and Distributed Processing Symposium*, Virtual Event, May 30-June 3, 2022, pp. 717-27. [Acceptance Rate: 25% (123/474)]

Cluster 2021 J. Tian, S. Di, X. Yu, **C. Rivera**, K. Zhao, S. Jin, Y. Feng, X. Liang, D. Tao, and F. Cappello, "Optimizing Error-Bounded Lossy Compression for Scientific Data on GPUs," *2021 IEEE International Conference on Cluster Computing*, Virtual Event, September 7-10, 2021, pp. 283-93. [Acceptance Rate: 29% (48/163)]

IPDPS 2021 J. Tian, **C. Rivera**, S. Di, J. Chen, X. Liang, D. Tao, and F. Cappello, "Revisiting Huffman Coding: Toward Extreme Performance on Modern GPU Architectures," *The 35th IEEE International Parallel and Distributed Processing Symposium*, Virtual Event, May 17-21, 2021, pp. 881-91. [Acceptance Rate: 22% (105/462)]

PACT 2020 J. Tian, S. Di, K. Zhao, **C. Rivera**, M. H. Fulp, R. Underwood, S. Jin, X. Liang, J. Calhoun, D. Tao, and F. Cappello, "cuSZ: An Efficient GPU-Based Error-Bounded Lossy Compression Framework for Scientific Data," *The 29th International Conference on Parallel Architectures and Compilation Techniques*, Atlanta, GA, Oct 3-7, 2020, pp. 3-15. [Acceptance Rate: 25% (35/137)]

Refereed Journal Publications

JPDC **C. Rivera***, J. Chen*, N. Xiong, S. Song, and D. Tao, "TSM2X: High-Performance Tall-and-Skinny Matrix-Matrix Multiplication on GPUs," *Journal of Parallel and Distributed Computing*, Volume 151, 2021, pp. 70-85. [Impact Factor: 3.734]

Awards

2022–2026 **Graduate College Fellowship**, *University of Illinois Urbana-Champaign*

2022–2026 **SURGE Fellowship**, *Grainger College of Engineering, University of Illinois Urbana-Champaign*

Summer 2022 **Housing Fellowship**, *Oregon Programming Languages Summer School, University of Oregon*

Spring 2022 **Outstanding Undergraduate Award**, *Department of Computer Science, University of Alabama*

Spring 2022 **H. H. Chapman Outstanding Computer User Award**, *Randall Research Scholars Program, University of Alabama*, $500

Fall 2021 **R&D 100 Award Winner**, *For "SZ: A Lossy Compression Framework for Scientific Data"*

2018–2022 **Presidential Scholarship**, *University of Alabama*

Software Artifacts

cuSZ A GPU version of the R&D 100 award-winning SZ, an error-bounded lossy compressor for scientific data. Implemented in CUDA C++ for Nvidia GPUs. Compresses data with compression ratios up to 3.48x higher than other state-of-the-art GPU lossy compressors. URL: `https://szcompressor.org/`

TSM2X A collection of two GPU algorithms for multiplying irregular-shaped tall-and-skinny matrices: `TSM2L` and `TSM2R`. Implemented in CUDA C++ and tuned for Nvidia GPU architectures. Obtains average speedups of up to 1.9x over the vendor-supplied CUBLAS library. URL: `https://github.com/codyjrivera/tsm2x-imp`

Other Experience

2019–2020 **Undergraduate Teaching Assistant (CS 100)**, *The University of Alabama*, Tuscaloosa, AL
Tutored students during laboratory sessions and graded student projects.

Summer 2020 **Student Training in Engineering Program (STEP) Intern**, *Google*, Virtual Internship
Developed GrowPod, a web app that allows users to join, create, and administer community gardens using Google Cloud App Engine and Angular.

Coursework and Technical Skills

Relevant Coursework: Programming Languages, Compiler Construction, Real Analysis I and II, Abstract Algebra I and II, General Topology, Algebraic Topology (at Univ. of Alabama)

Workshops and Summer Schools: Oregon Programming Languages Summer School (Summer 2022)

Programming Languages: C, C++, Python, Java, JavaScript, TypeScript

Platforms and Tools: CUDA, OpenMP, Google Cloud, HTML, CSS, LaTeX

*Equal contribution